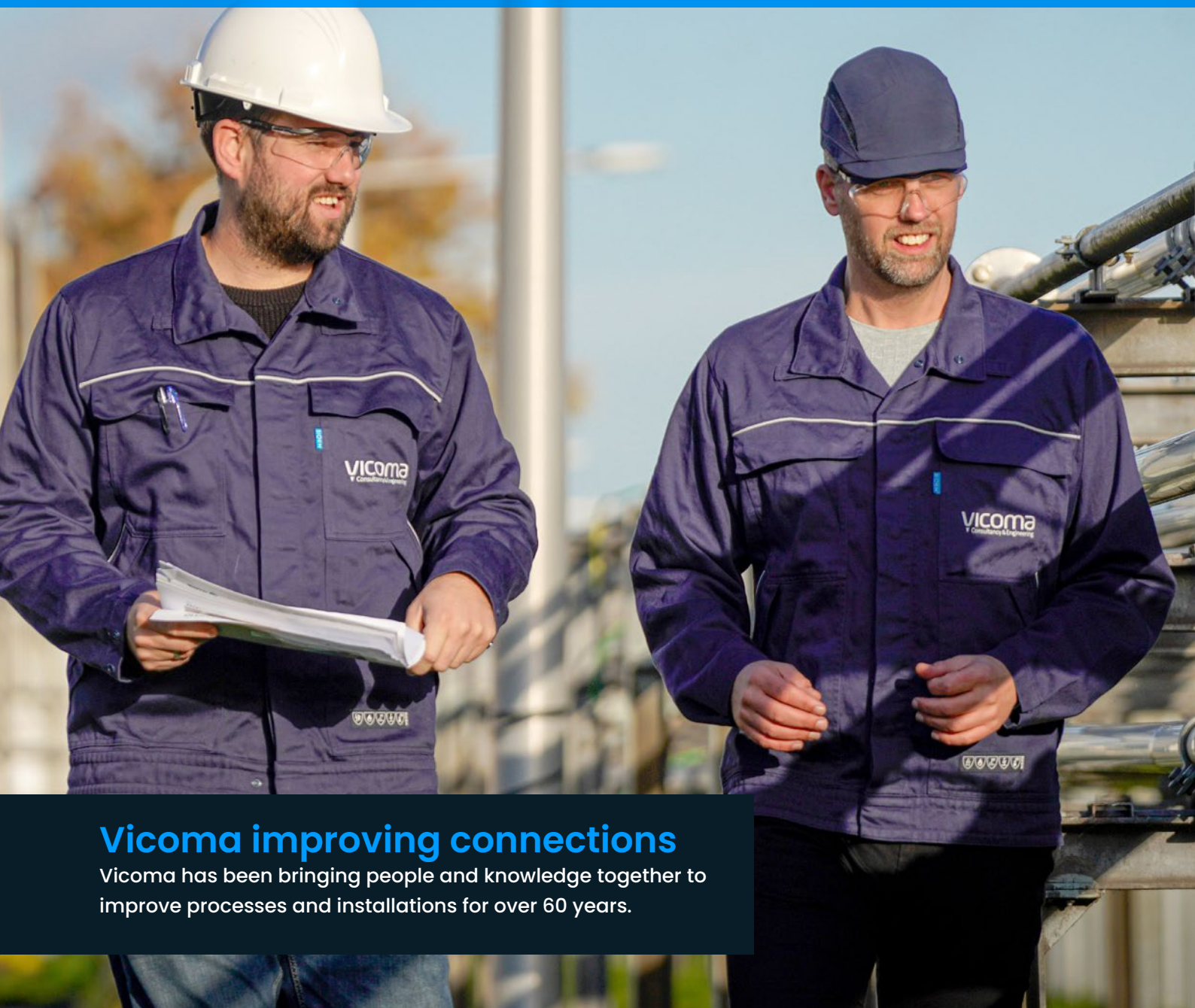


Conducting a network study

For a safe and future-proof
electrical installation



Vicoma improving connections

Vicoma has been bringing people and knowledge together to improve processes and installations for over 60 years.

Why conducting a network study?

Anyone designing an electrical installation or who wants to expand, troubleshoot faults or comply with laws and regulations, will need to calculate and evaluate the installation in many areas. These calculations (so-called grid studies) can be quite complex, but are incredibly important to ensure you have a safe and future-proof electrical installation. Vicoma has extensive expertise in this specialist field and is happy to support its customers in these often challenging undertakings.



Different types of grid studies.
*Hear are some examples that
Vicoma has experience with.*

Load flow study

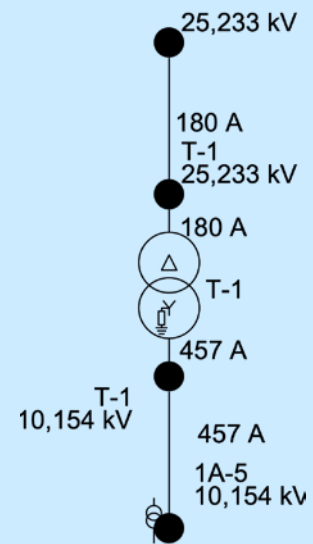
Electrical engineers use a load flow study to analyse and calculate how electrical power systems act at a given load. The purpose of this analysis is to calculate the voltages, currents and electrical powers in the system. This is necessary to upgrade system efficiency, stability and reliability, demonstrate redundancy and optimise grid openings.



Designing an installation

When designing an electrical installation, the engineer conducts a load flow study to determine the component dimensions. The main question is:

- What are the expected parameters in the new installation?
Consider:
 - Rated current for the components.
 - Voltage drop.
 - The consequences of the behaviour of electrical loads, such as inrush currents.



Expanding an installation

When expanding an existing electrical installation, a load flow study is able to show that no overloading occurs after expansion. The study helps identify weaknesses in the system. The main questions are:

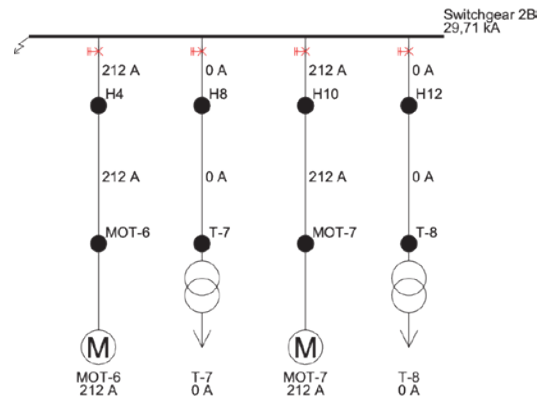
- Can we connect the additional consumers?
- Does the contract with the energy supplier meet the specifications?
- How does the extra power affect the components and redundancy?
- What does the power do in combination with other large e-consumers?
- Will large generators be switched off, such as a CHP (combined heat and power)?



Short circuit calculations

Electrical installations need to be designed so that there is no danger to persons in the event of a short circuit. The short circuit calculation is therefore essential when designing a new installation, but even more so when the plant is expanded with generators or motors, for example.

Vicoma uses software that performs short circuit calculations according to IEC 60909, the international standard for this type of calculation.



Arc calculations

Standards NEN 3140 and NEN 3840 stipulate that an employer is obliged to protect employees from the dangers of an electric arc. Performing an arc flash hazard analysis is a first step in assessing the danger of arcs in the electrical installation.

Vicoma uses software to calculate both the arc currents and the thermal energy released by an electric arc. Calculations are made either in accordance with ISSA (European) or IEEE 1584 (US) standards. The IEEE 1584 is applied in the Netherlands only by US-oriented companies, as PPE classes are determined in compliance with the US standard and are therefore not available with CE mark.



Arc calculation and solutions

If arc calculations show that the heat released exceeds the permissible limit to operate the system on site, the arc energy can be reduced in various ways. The most efficient method is the rapid and efficient shut-down of the arc. This can be done by fitting a special protection device that can detect the arc, or by reducing the time settings of devices. When doing either of those, it is important to pay close attention to selectivity in the system to avoid unwarranted switching off of power supplies.

Want to know more about arc calculations? Read more in Vicoma's [Arc flash hazard analysis](#) brochure.

Protection settings and selectivity

All protection settings, including the protection settings of low-voltage circuit breakers and fuses, can be transferred to the software model (Vision). Once the Vision model has all the safeguard settings, the software is able to generate selectivity diagrams.

Vision Software

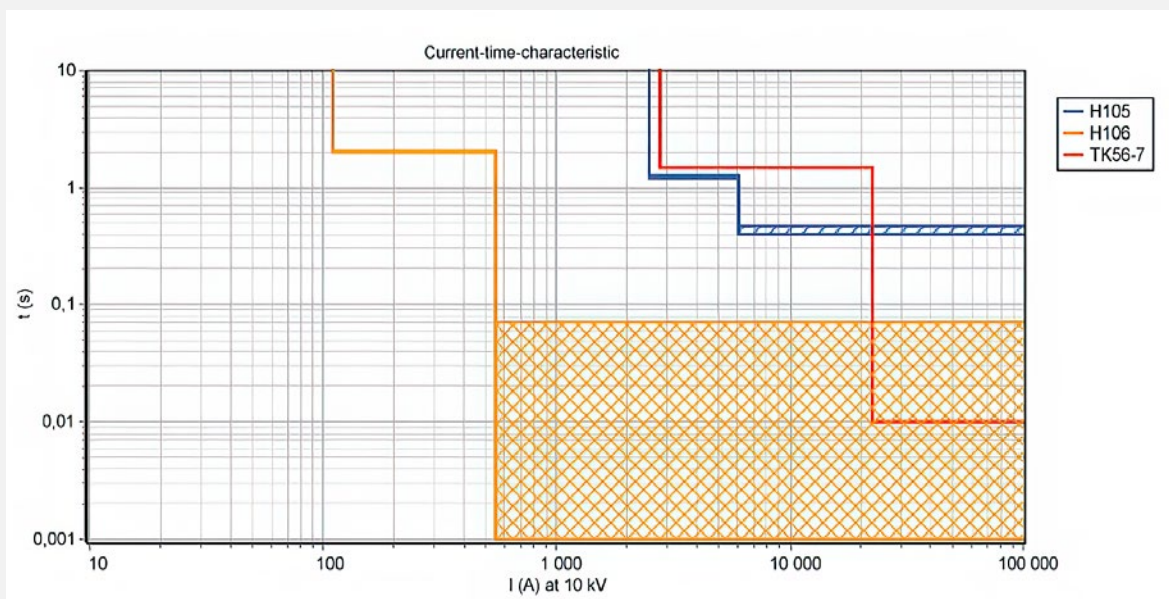
Vicoma uses Vision software to conduct its grid studies. The software makes it possible to model a Medium-Voltage (MV) / High-Voltage (HV) system by entering all the applicable technical data. This includes electrical data of components such as rated voltages and rated currents, as well as short-circuit resistance of distributors, transformers, rated and starting currents of motors and generators, response times of switches, and so on.

→ Manually or with a database

A model can be built in two ways with the Vision software package. The first is with individual components that the user installs manually according to the right specifications. The second method is using a database that retrieves all type specifications for the MV/HV components that are present. Working with a database saves a lot of time and is less prone to error when the same components are repeatedly used.

→ Basic or detailed calculation

Vision Software can optionally include just the main components in the model. This allows basic calculations (load flow, short circuit currents) to quickly be made. Building more detailed models with safeguards is also an option. This is interesting when doing the arc calculations and to determine the selectivity in a system.





More than calculations alone

Vicoma's strength is that experts don't just do all the calculations. They also use their vast technical knowledge and engineering expertise to think along with customers. No matter how big the electrical engineering challenge, our experienced engineers are ready to take it on.

We start by looking at what is needed from your perspective as the client and, based on the finding, propose the best solution.

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Our consultancy and engineering firm has been working for 60 years with a wide array of clients on single and multidisciplinary projects. What can you expect from us? A pragmatic and flexible approach.

Our engineers are capable of overseeing diverse projects from start to finish, handling the engineering aspect efficiently. We also operate swiftly with flexible teams and streamlined communication channels. Being an independent family-owned business, it's inherent for us to prioritize your interests alone. As such, we are not publicly listed and are not tied to specific contractors.

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